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STATE OF ALASKA

William A. Egan, Governor

ANNUAL REPORT OF PROGRESS, 1969 - 1970

FEDERAL AID IN FISH RESTORATION PROJECT F-9-2

SPORT FISH INVESTIGATIONS OF ALASKA

ALASKA DEPARTMENT OF FISH AND GAME

Wallace H. Noerenberg, Commissioner

DIVISION OF SPORT FISH

Rupert E. Andrews, Director

Howard E. Metsker, Coordinator

INTRODUCTION

This report of progress consists of Job Segment Reports from the State of Alaska, Federal Aid In Fish Restoration, Project F-9-2, "Sport Fish Investigations of Alaska".

The studies reported herein are investigations evaluating the sport fish resources of the state. Recreational and other impacts on the fishery resources necessitates a continuous endeavor of ascertaining facts and knowledge of the fisheries. The 24 jobs reported on are of a continuing nature. The investigations are composed of 11 projects involved with the inventory and cataloging of the sport fish waters of the state, sport fishery creel censuses, and access. Fish species that received special investigational effort include: Dolly Varden, anadromous fish, grayling, sheefish, whitefish, pike, char, and salmon. The information gathered from the combined studies provides necessary background data for a better understanding of management problems and constitutes a basis for necessary future investigations.

The subject matter contained in these reports is incomplete, and the findings and interpretations subject to re-evaluation as work progresses.

RESEARCH PROJECT SEGMENT

State: Alaska

Project No.: F-9-2 *Name:* Sport Fish Investigations of Alaska.

Job No.: 15-C *Title:* **Monitoring and Evaluation of Arctic Waters with Emphasis on the North Slope Drainages.**

Period Covered: July 1, 1969 to June 30, 1970.

ABSTRACT

This report presents the results of preliminary investigations of fish populations in waters of the north slope of the Brooks Range and northwestern Alaska.

An experimental commercial whitefish, Coregonus sp., and Arctic char, Salvelinus alpinus, fishery in the Colville River delta and at Thetis Island was monitored.

Information on relative abundance, age, growth, and sexual maturity was obtained for broad whitefish, Coregonus nasus; humpback whitefish, C. lavaretus pidschian; and Arctic char. Size, age, and sex data was obtained for other species captured incidental to this fishery.

A limited morphological study was conducted on Colville River area Arctic char.

Preliminary surveys were conducted on 7 lakes and 11 streams representative of various North Slope waters. Age, length, and sex data from fish captured during these surveys is presented.

Catch estimates from the subsistence fishery in the Wulik River in northwestern Alaska indicate a spring harvest of 8,402 Arctic char weighing 18,912 pounds.

First season investigations of this project were terminated by the loss of two Sport Fish Division biologists, Peter Winslow and Rex Thomas, while conducting investigations in the Beaufort Sea in mid-August.

RECOMMENDATIONS

1. Conduct a limnological study of the Colville River.
2. Assess environmental characteristics of water in Arctic National Wildlife Refuge for comparison of ecological changes due to oil development.
3. Continue assessment of fishery waters adjacent to North Slope oil developments and along the route of the proposed Trans Alaska Pipeline.
4. Continue monitoring of sport, subsistence, and commercial fisheries of North Slope waters.

5. Initiate life history studies of anadromous whitefish, salmon, and Arctic char of the Beaufort Sea.

6. Evaluate water-use developments and their effect on North Slope streams and lakes for protection of the fishery resources.

OBJECTIVES

1. To assess the environmental characteristics of the existing and potential fishery waters of the North Slope adjacent to oil drilling sites and the proposed Trans Alaska Pipeline.

2. To evaluate multiple-use, water development projects and their effects on the North Slope streams and lakes for the protection of the fishery resources. Life history studies will be initiated.

3. To determine present utilization of fishery populations, subsistence, sport and commercial, of North Slope waters.

4. To determine the status of the Arctic char stocks in the Kivalina-Kotzebue area.

5. To determine the impact of other fishery uses on the char stocks in the Kivalina-Kotzebue area.

TECHNIQUES USED

Fish were captured with seine, minnow trap, rotenone, hook and line, dip net, and gill net of standard construction or of monofilament 125' x 6' with five graduated mesh sizes ranging from 1/2" - 2 1/2" square bar measure.

Fork length of fish was measured to the nearest millimeter. In instances where male Arctic char exhibited considerable kype development, measurements were made from the upper jaw to the fork of the tail.

Age determinations were made from scale samples or otoliths. Scales were either impressed on cellulose acetate with an Ann Arbor Roller Press, or mounted between glass slides prior to reading. A Bausch and Lomb microprojector was used for scale reading.

Arctic char and burbot, Lota lota, were aged using otoliths. The methods were similar to those described by Heiser (1966) except xylene rather than water and household detergent was used to immerse the otoliths while they were being read.

All sex and maturity determinations were made from examination of the gonads. Fish which appeared in condition to spawn were termed potential spawners; if not in spawning condition, fish were termed either immature or as having some development, according to gonad appearance.

Meristic counts made on Arctic char follow Hubbs and Lagler (1958).

FINDINGS

Colville River Delta and Thetis Island

During July and August, 1969, a trial gill-net fishery was conducted on the Colville River delta and Thetis Island by Harmon "Bud" Helmericks, a resident of the delta, to determine the feasibility of a summer commercial fishery for whitefish and Arctic char.

FIGURE 1 LENGTH FREQUENCY OF 137 BROAD WHITEFISH - WEST BRANCH COLVILLE RIVER DELTA, 1969.

FIGURE 2 LENGTH FREQUENCY OF 35 BROAD WHITEFISH - EAST BRANCH COLVILLE RIVER DELTA, 1969.

TABLE 1 Helmericks' Fishery - Colville River Delta and Thetis Island, 1969.

Location	Gear Used	Fish Caught*										Total Fish	Fish/ Net Day
		AC	BWF	CS	Fl	FHS	HWF	C**	NP	PS	Sm		
Mouth of West Branch Colville River (7/18-7/31/69; 14 net-days)	10 nets (100'; 5" stretched mesh)	13	394	9	4	3	39	1	1	2	20	486	3.47
Mouth of East Branch Colville River (8/2-8/4/69; 3 net-days)	1 net (150'; 3" stretched mesh)	1	66	--	--	9	75	7	--	--	--	158	52.7
Thetis Island (8/11-8/30/69; 41 net-days)	1-3 nets (125' & 150'; 3" & 4" stretched mesh)	357	--	--	--	--	1	8	--	--	--	366	8.9
								Total fish				1,010	

*AC - Arctic char; BWF - Broad whitefish; HWF - Humpback whitefish; CS - Chum salmon; Fl - Flounder; NP - Northern pike; PS - Pink salmon; FHW - Fourhorn sculpin; Sm - Smelt; C - Cisco.

**Includes least and Arctic cisco.

Helmericks invited the Department of Fish and Game to monitor this activity, and a department technician was provided for sampling during the entire fishery.

Table 1 lists the areas fished, dates, species, and total number of fish captured.

Species captured were broad whitefish, Coregonus nasus; humpback whitefish, C. pidschian; Arctic char, Salvelinus alpinus; chum salmon, Oncorhynchus keta; pink salmon, O. gorbuscha; Arctic cisco, C. autumnalis; least cisco, C. sardinella; flounder (Arctic flounder) Liopsetta glacialis or starry flounder, Pleuronectes stellatus - species not positively identified; smelt, Osmerus dentex - also not positively identified; fourhorn sculpin, Myoxocephalus quadricornis; and northern pike, Esox lucius.

When relatively large numbers of a species were captured, only a representative portion was sampled.

The mouth of the West Branch of the Colville delta was the most intensively sampled and provided the largest number of species. Chum and pink salmon, northern pike, flounder, and smelt were captured only at the mouth of the West Branch.

Broad Whitefish:

Of the 394 broad whitefish captured in the West Branch, 137 were sampled, with a sex ratio of 51% female to 49% male. Figure 1 gives the length frequency and mean length of these fish. All but one were judged to be potential spawners.

Of the 66 broad whitefish captured in the East Branch, 35 were sampled, with a sex ratio of 35% female to 65% male. Only two of these fish were potential spawners. Figure 2 gives the length frequency and mean length of these fish.

Table 2 presents the age composition of these two groups of broad whitefish. The complete separation by age, V to VII year class fish for the East Branch, and VIII to XIII year class fish for the West Branch, can be partially explained by the difference in net mesh size used (5" stretched mesh for the West Branch vs. 3" stretched mesh for the East Branch); however, smelt, sculpin, flounder, and least cisco, all smaller than the smallest broad whitefish captured in the West Branch, were taken in the same nets.

Humpback Whitefish:

Figure 3 presents the length frequency and mean length of 32 humpback whitefish sampled from the West Branch. Sixty-four percent of these fish were female, 36% were male, and all but one were potential spawners.

Figure 4 gives the length frequency and mean length of 31 humpback whitefish sampled from the East Branch. Fifty-four percent were female, 46% were male, and 19 were potential spawners.

Table 3 gives the age-length composition of these two groups of humpback whitefish. As with the broad whitefish, little overlap in age or length was found between the West and East Branch samples.

In Helmericks' fall whitefish fishery in the Colville delta, it was noted by Alt (1968a) that only about 1% of the total catch was humpback whitefish. The bulk of the catch consisted of Arctic and least cisco. No broad whitefish were noted in this fall fishery.

Thetis Island Arctic Char:

The exploratory fishery off Thetis Island, approximately eight miles northeast of the Colville River delta, produced 357 Arctic char, of which 148 were sampled.

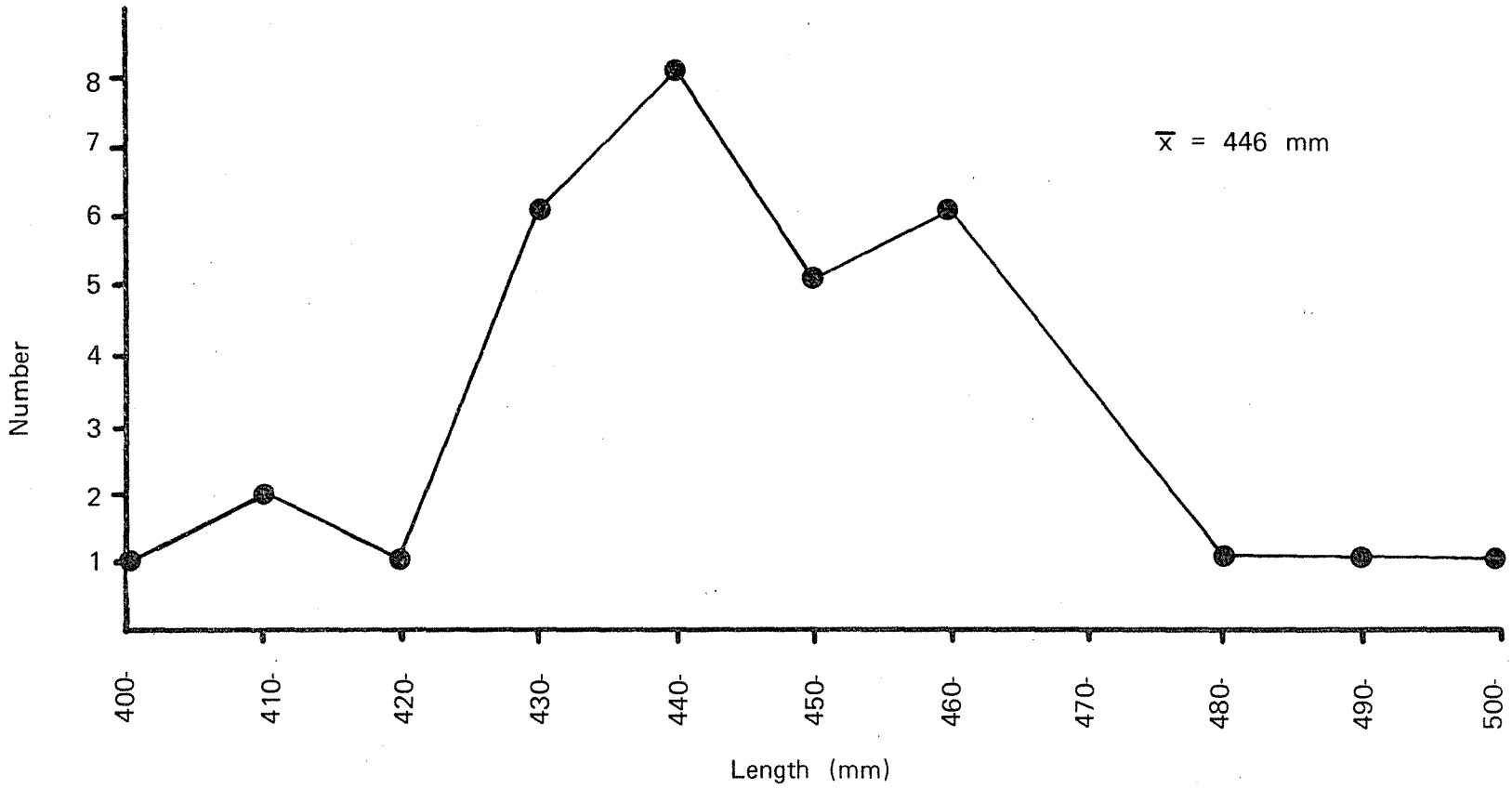

FIGURE 3 LENGTH FREQUENCY OF 32 HUMPBACK WHITEFISH - WEST BRANCH COLVILLE RIVER DELTA, 1969.

TABLE 2 Length and Age Composition of Colville River Delta Broad Whitefish, 1969.

Age Class	Length Range (mm)	Mean Length (mm)	No. in Sample
EAST BRANCH:			
V	300-350	329	10
VI	295-345	322	17
VII	330-490	398	4
WEST BRANCH:			
VIII	460-540	490	8
IX	470-545	507	18
X	515-596	550	18
XI	540-586	566	10
XII	610-650	630	2
XIII	603-620	610	4

TABLE 3 Length and Age Composition of Colville River Delta Humpback Whitefish, 1969.

Age Class	Length Range (mm)	Mean Length (mm)	No. in Sample
EAST BRANCH:			
VI	325-350	337	3
VII	345-390	367	12
VIII	345-405	370	9
IX	405-415	410	2
WEST BRANCH:			
IX	400-460	434	10
X	410-481	445	12
XI	445-490	461	5
XII	500	500	1

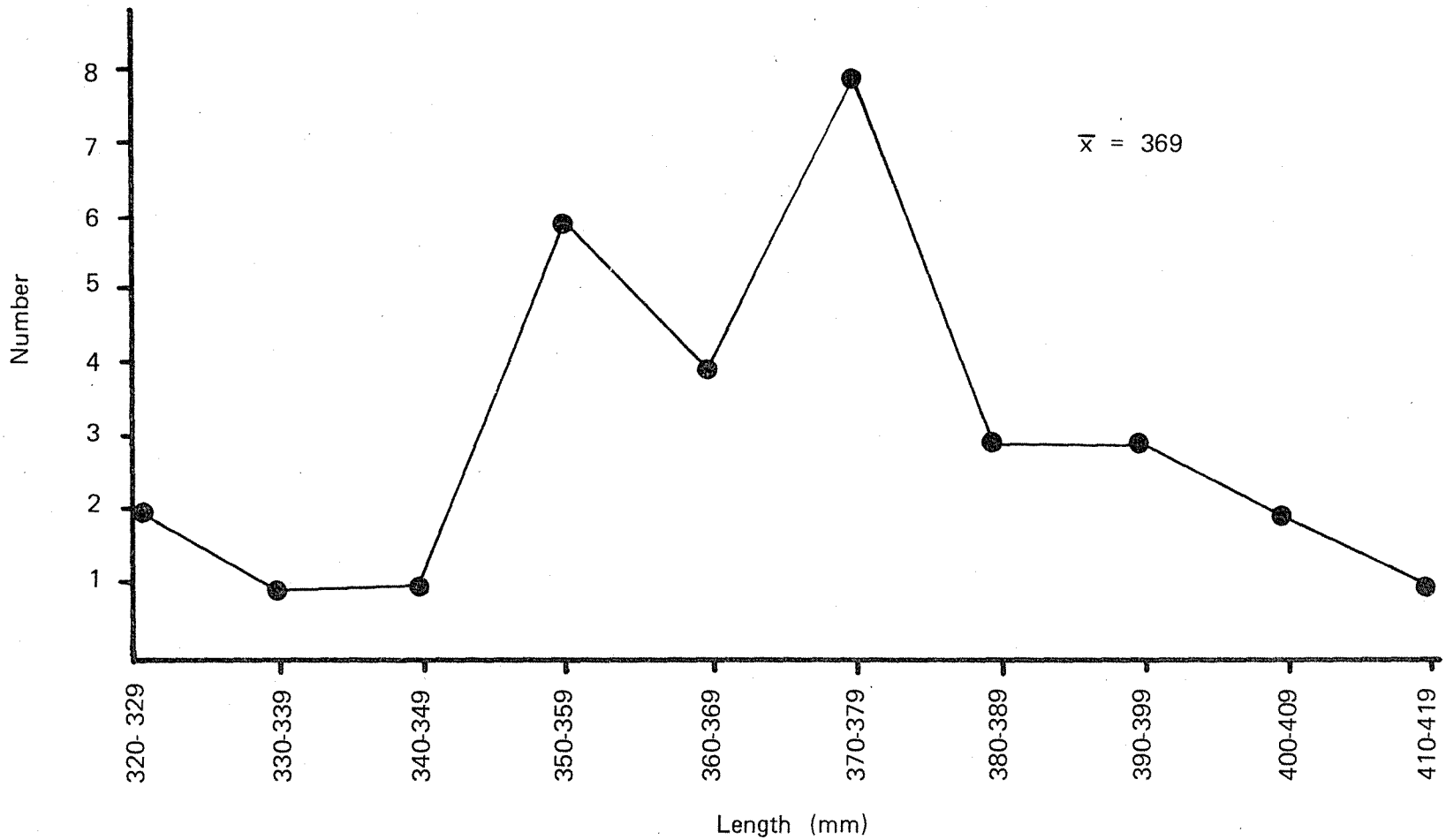

FIGURE 4 LENGTH FREQUENCY OF 31 HUMPBACK WHITEFISH - EAST BRANCH COLVILLE RIVER DELTA, 1969.

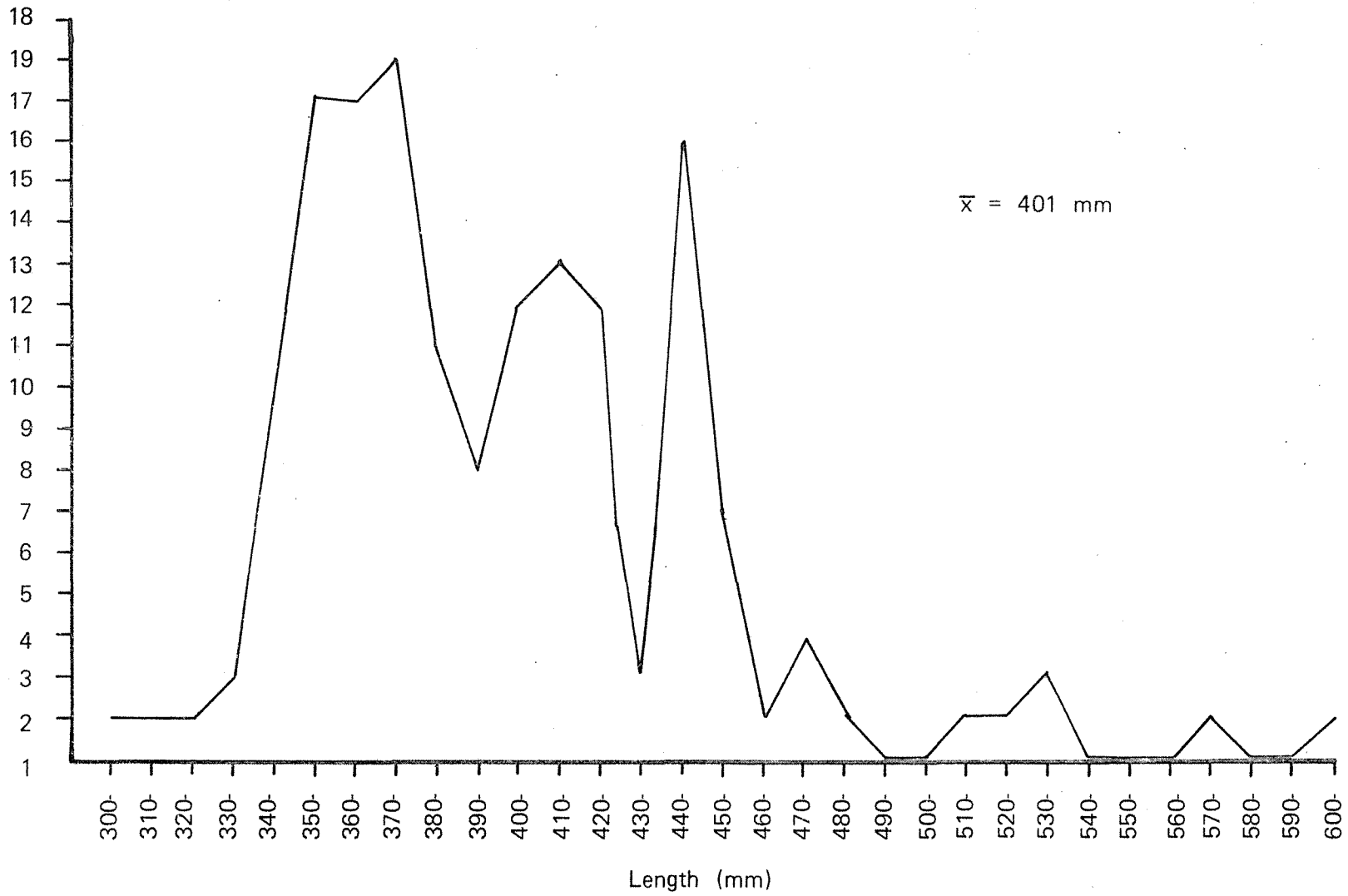

FIGURE 5 LENGTH FREQUENCY OF 148 ARCTIC CHAR - THETIS ISLAND, 1969.

Figure 5 presents the length frequency and mean length of these char. Fifty-six percent of these char were female and 44% were male. Only two fish were judged to be potential spawners, but all other char sampled exhibited some gonad development.

Fifty-three char were selected to equally represent the various length classes. The age-length composition of these fish is presented in Table 4.

TABLE 4 Age-Length Composition of 53 Arctic Char,* Thetis Island, 1969.

Age Class	Length Range (mm)	Mean Fork Length (mm)	No. in Sample	Sex	
				Female	Male
IV	305-395	344	5	3	2
V	345-440	382	8	3	5
VI	330-455	397	13	8	5
VII	370-530	440	12	7	5
VIII	355-510	420	8	5	3
IX	370-525	422	3	2	1
X	405-576	504	3	1	2
XI	605	605	1	0	1

*Fifty-three char selected to represent the various length classes nearly equally.

Although this fishery was conducted from August 11 through August 30, fishing after August 18 was unproductive. It is probable that fishing in late July and early August would be preferable.

Colville River Delta Arctic Char:

The length, age, sex, and maturity data of the 19 Arctic char captured in the Colville River delta is presented in Table 5. The mean length of these char is considerably greater than the Thetis Island char (Figure 5). Possibly the larger mesh nets used in the Colville delta West Branch reflect the difference in length. However, 79% of the Colville delta char were judged potential spawners as opposed to the 1.4% of the Thetis Island char that were potential spawners.

Gill Raker and Pyloric Caeca Counts - Arctic Char:

A limited morphological study of Colville River and Thetis Island char was conducted. Gill raker and pyloric caeca counts of these fish are presented in Table 6.

A separation of Arctic char and the closely related Dolly Varden char, S. malma, based on gill raker and pyloric caeca counts by McPhail (1961) follows:

Species	Gill Rakers		Pyloric Caeca
	Upper 1st Arch	Lower 1st Arch	
S. malma	3 to 9	8 to 14	13 to 47
S. alpinus	7 to 13	12 to 19	20 to 74

A comparison of these counts with those noted in the Colville River and Thetis Island char shows that the gill raker number for the upper limb of the first arch is the only measurement we have taken that separates these two species.

TABLE 5 Length, Age, and Sexual Maturity of Arctic Char, Colville River Delta, 1969.

Fork Length (mm)	Sex*	Maturity**	Age Class
WEST BRANCH:			
430	F	S	VIII
435	F	S	VII
453	M	S	VI
490	M	P	----
505	F	P	VII
528	F	P	VIII
550	M	P	VI
550	M	S	IX
555	F	P	X
568	F	P	IX
590	M	P	XI
600	M	P	IX
600	F	P	VIII
610	M	P	IX
610	F	P	IX
615	M	P	X
655	M	P	X
695	M	P	X
Mean Length - 558 mm			
EAST BRANCH:			
475	F	P	VII

*F - Female; M - Male.

**P - Potential Spawner; S - Some development of gonads.

Salmon:

During this fishery, 11 chum salmon and 2 pink salmon were captured, all in the West Branch of the Colville delta. Table 7 lists the length, sex, and age composition of these salmon. All fish sampled were potential spawners.

TABLE 6 Gill Raker and Pyloric Caeca Counts of Arctic Char, Colville River Delta and Thetis Island, 1969.

	Upper Limb		Lower Limb	No. Fish Sampled
First Arch Gill Rakers:				
	10	+	11	2
	10	+	12	6
	10	+	13	6
	11	+	11	1
	11	+	12	6
	11	+	13	5
	12	+	12	1
	12	+	13	1
Mean	10.6		12.3	28
Range	10-12		11-13	

Pyloric Caeca:

Fish sampled - 27; Range - 25-42; Mean - 31.7.

Scale samples of these fish sent to the Commercial Fisheries Division for corroboration of age elicited the following: "These scales appear to be fairly typical of other Arctic-Yukon-Kuskokwim salmon scales. There was relatively little current season's growth for samples taken during late July. No doubt this is a function of the colder water temperatures of the region" (Ron Regnart, personal communication).

Miscellaneous Fish - Colville Delta and Thetis Island:

Data from the remaining species, captured incidentally in this fishery is presented in Table 8.

Arctic cisco were taken only near Thetis Island; however, in Helmericks' fall (October) fishery in the Colville delta, Arctic cisco was the most important species, comprising approximately 60% of the catch, or 24,000 pounds annually (Alt, 1968a). This supports Helmericks belief that the Arctic cisco is an ocean fish and remains in the lower reaches of the Colville River in the fall. In the fall of 1968, Alt noted that none of the Arctic cisco captured were potential spawners or had recently spawned; whereas, one-third of the

Arctic cisco captured near Thetis Island in August, 1969, were judged to be potential spawners. These Arctic cisco showed rapid growth in later years as revealed by scale analysis.

Only eight least cisco were captured in the Colville delta in the summer fishery, but approximately 39% of the catch in the fall fishery was least cisco. It is probable that this species also is mainly an estuarine, or ocean, fish during summer months, as is the Arctic cisco.

One 690 mm, 14-year-old, female northern pike was captured in the West Branch, Colville delta. This fish had a linear growth rate similar to that of pike from lakes of the South Slope of the Brooks Range (Roguski, 1968), although it lags behind that of pike from the Minto Flats near Fairbanks (Alt, 1968b).

TABLE 7 Length and Age Composition of Chum and Pink Salmon from West Branch Colville River Delta, 1969.

Species	Length (mm)	Sex	Age*
Chum Salmon	585	F	4_1
	600	M	4_1
	600	F	4_1
	610	F	4_1
	615	M	5_1
	615	M	5_1
	620	M	4_1
	645	M	5_1
	650	M	4_1
	650	M	5_1
	660	M	4_1
Pink Salmon	460	-	-
	530	M	2_1

*Age based on Gilbert-Rich System. A 4_1 fish, for example, is in its fourth year of life and migrated to sea during its first year.

TABLE 8 Length, Sex, Maturity, and Age of Miscellaneous Fish Collected, Colville River Delta and Thetis Island, 1969.

Species	Location*	No.**	Length Range (mm)	Mean Fork Length (mm)	Sex Comp. M	Sex Comp. F	% Sexual Maturity*** I	% Sexual Maturity*** S	% Sexual Maturity*** P	Age Range
Arctic cisco	T	8	290-390	346	50	50	--	67	33	IV-VII
Fourhorn sculpin	E	9	205-305	236	87	13	--	--	100	----
	W	1(F/P)	220							----
Least cisco	E	7	310-345	324	100	--	--	--	100	VI-VIII
	W	1(F/P)	275							V
Northern pike	W	1(F/S)	690							XIV
Smelt	W	19	165-280	238	61	39	6	11	83	----
(Starry) flounder	W	3	210-236	221	100	--	--	--	100	----

*E - East Branch, Colville River delta.
W - West Branch, Colville River delta.
T - Thetis Island

**F/P - Female, potential spawner
F/S - Female, some development of gonads.

***I - Immature
S - Some development of gonads
P - Potential spawner.

Positive identification of the smelt and flounder was not accomplished in the field and specimens for laboratory analysis were subsequently lost; however, it is probable that the species are Arctic smelt and starry flounder.

North Slope Lake and Stream Surveys

During July, 1969, preliminary surveys were conducted on 7 lakes and 11 rivers and creeks. Because of limited means of access, either fixed-wing float aircraft or helicopter were the primary modes of transportation.

Surveys were of short duration, often with the aircraft standing by while a stream or lake was sampled with rotenone, seine, gill net, or by angling. A notable exception was a float trip survey by inflatable boat down the Ribdon and Sagavanirktok rivers.

Length, sex, and age data of the fish captured in these surveys is presented in Table 9.

Lake Surveys:

Elusive Lake is located at Lat. 68°40'N, Long. 148°30'W, and is 920 acres. This lake in the foothills of the north Slope of the Brooks Range was sampled briefly by hook and line, with a single, mature 450 mm lake trout, S. namaycush, being taken. However, Arctic char and a number of grayling, Thymallus arcticus, are also reported to be present. Ninespine stickleback, Pungitius pungitius, were captured and round whitefish, Prosopium cylindraceum, observed.

Snails were abundant in shoal areas. The lake has an intermittent outlet to the Ribdon River that was not flowing at the time of survey.

Galbraith Lake is 1,540 acres in size and is located at Lat. 68°27'N, Long. 149°20'W. This lake is in the foothills of the Brooks Range North Slope. One burbot, Lota lota, 150 mm, was taken with rotenone. A short period of angling produced no fish, although both Arctic char and lake trout are reported to be present. The outlet of this lake flows into the Atigun River. A large amount of debris, chiefly gas cans and oil drums, mars the scenic beauty of the lake and its surroundings.

Itkillik Lake is 1,330 acres in size. Located at Lat. 68°25'N, Long. 149°55'W, this is another lake representative of the foothill lakes of the North Slope. A good lake trout population is indicated by six lake trout, ranging in length to 452 mm, taken in 45 minutes of angling. Arctic char, grayling, burbot, and round whitefish, are reported to be present. An abundant population of snails was noted. The lake outlet drains into the Itkillik River.

"Oil Drum Lake" is located at Lat. 69°47'N, Long. 148°55'W and is 1,025 acres in size. An unnamed lake at 238' elevation just west of Franklin Bluffs, this lake is representative of many of the shallow lakes on the North Slope. No net was set as a transect of the lake revealed a maximum depth of only five feet, with no inlet or outlet. The lake is defiled with a large number of oil drums both on shore and in the lake. Surface water temperature on July 23 was 49°F.

"Sagwon Lake" is 400 acres in size and is located at Lat. 69°20'N, Long. 148°35'W. This is an unnamed lake approximately 1/2-mile east of the Sagwon airfield at 730' elevation. When surveyed on July 23, the surface water temperature was 56°F. Two grayling, 168 and 210 mm were captured in one graduated-mesh gill net set for 13 hours. The water color was clear and maximum recorded depth was 14 feet. A small intermittent outlet to the Ivishak River was not flowing.

Teshekpuk Lake is 212,000 acres in size. Located at Lat. 70°35'N, Long. 153°30'W, this lake, by far

TABLE 9 Length, Sex, and Age of Fish from Various North Slope Waters, 1969.

Name	Species	Length (mm)	Sex	Age Group
Streams:				
Itkillik	AC	485	F	
	BWF	525	M	IX
	BWF	540	F	X
	BWF	540	F	X
	BWF	550	F	XI
Ivishak R.	GR	360	M	VIII
Kuparuk R. (upper)	GR	300	F	VI
	GR	300	M	VII
	GR	305	F	VII
	GR	330	F	VII
Lupine R.	RWF	360	F	VII
	GR	345	F	VIII
	GR	350	M	VIII
	GR	370	M	VIII
	AC	560	F	VII
	AC	561	F	IX
	AC	600	F	VIII
	AC	610	M	IX
	AC	620	M	XI
	AC	645	M	X
	AC	660	M	XI
	AC	660	M	XI
	AC	663	M	XI
	AC	670	M	IX
	AC	675	M	X
	BB	480	M	VII
Ribdon R.	AC	540	F	VI
	AC	585	M	X
	GR	170	-	III
	GR	188	M	IV
	GR	225	M	V
	GR	295	M	VI
	GR	325	M	VI
	GR	330	F	VII
	GR	338	M	VII
	GR	343	M	VII
	GR	365	F	VIII
	GR	540	F	VI
	GR	585	M	X
Section Cr.	GR	160	F	III
	GR	220	F	IV

TABLE 9 (Cont) Length, Sex, and Age of Fish from Various North Slope Waters, 1969.

Name	Species	Length (mm)	Sex	Age Group
Section Cr. (Cont)	GR	225	M	V
	GR	250	M	V
	GR	250	F	V
	GR	265	F	V
	GR	270	F	V
Toolik R.	GR	285	F	VII
	GR	295	F	VI
	GR	305	M	VI
	GR	310	M	VII
	GR	310	M	VII
	GR	310	F	VII
	GR	310	F	VII
	GR	315	M	VI
	GR	325	F	VII
	GR	334	F	VII
	GR	345	F	VII
	GR	345	F	VIII
	GR	350	M	VIII
	GR	355	F	VIII
Unnamed Cr. (Trib. of Sagavanirktok Rv)	GR	345	F	VII
	GR	375	M	VIII
	GR	380	M	VIII
Sagavanirktok R.	BB	430	M	VII
Lakes:				
Elusive L.	LT	450	F	X
Itkillik L.	LT	390	F	VIII
	LT	395	F	VIII
	LT	420	M	VIII
	LT	430	M	IX
	LT	435	M	IX
	LT	452	M	X
"Sagwon" L.	GR	168	M	III
	GR	210	F	IV
Teshekpuk L.	GR	330	F	VII
	GR	350	F	VIII
	GR	355	M	VIII
	GR	362	F	VIII
	GR	384	M	VIII
	BWF	505	M	IX
	LC	340	F	VII

the largest of the North Slope, is 75 miles southeast of Barrow. In late July, two gill nets were set at the outlet of the lake. The nets were lifted 42 hours later with a catch of five adult grayling, one broad whitefish, and one least cisco. Both the whitefish and cisco were potential spawners.

Although no sounding was done, the lake is visibly quite shallow and turbid. Water temperature on July 23 was 46°F. Helmericks reported that "salmon (species?) in fair numbers enter the lake in August". (viva voca)

Unnamed Lake is located at Lat. 69°35'N, Long. 145°28'W and is 300 acres in size. This lake is three miles northeast of VABM 553 NORA near the Sagavanirktok River. The lake was sampled with one graduated-mesh gill net for 12 hours. No fish were captured. The lake had a surface temperature of 50°F on July 23. Maximum depth recorded was nine feet. The water was turbid. No inlets or outlets exist.

Stream Surveys:

The Atigun River was surveyed at two locations: Lat. 68°05'N, Long. 149°20'W and Lat. 68°20'N, Long. 149°20'W, the headwaters section, approximately 20 miles south of Galbraith Lake, and a location approximately 6 miles above Galbraith Lake.

This is a large river, over 200' wide in many places. It is very braided and has a rapid velocity, turbid water, and broad mud or silt bars, and small gravel. Many young grayling were taken with rotenone, even in the swift, cold (38°F on July 11) headwaters. Two adult round whitefish were also captured. The Atigun River is an important tributary of the Sagavanirktok River.

The Itkillik River was surveyed at Lat. 70°08'N, Long. 150°50'W. This river was sampled with two gill nets approximately 1/2 mile above its confluence with the Colville River. The nets were fished for 72 hours, catching one potential spawner Arctic char and four broad whitefish. Burbot and chum salmon are also reported to be present.

The Ivishak River was surveyed at Lat. 69°30'N, Long. 148°30'W at its confluence with the Sagavanirktok River several miles north of Sagwon. One mature grayling and five round whitefish were captured by gill net. This 98-mile long river has two channels near its mouth; each channel is approximately 40 yards wide and 4 feet deep, with a gradient of 25 feet per mile. Pools are infrequent and rapids are separated by long stretches of fast water. Bottom materials consist of gravel and boulders. The water was cold (42°F on July 24) and turbid. Periodic flooding above the six-foot-high banks was indicated.

The Kuparuk River was surveyed at Lat. 68°48'N, Long. 149°38'W briefly with a helicopter for access. Four grayling from 300 - 330 mm in length were captured with rotenone. The river in its upper reaches is 75 - 100' wide, clear, swift, shallow, and very rocky. Water temperature was 51°F on July 11. The river enters the Beaufort Sea west of Prudhoe Bay.

The Lupine River was surveyed at two locations, Lat. 69°05'N, Long. 148°43'W and Lat. 69°10'N, Long. 149°15'W. This tributary of the Sagavanirktok River was surveyed in its upper reaches by means of a helicopter. Two grayling, two round whitefish, one burbot, and several sculpin, Cottus sp., were captured with rotenone. The river at this location was approximately 20' wide, with depths of 1 - 3'. The river was clear in color and contained a bottom of coarse gravel and mud. Water temperature on July 10 was 57°F.

On July 21 the mouth of the Lupine River was surveyed by inflatable boat. Eleven Arctic char potential spawners and one grayling were captured by angling. At this location, the river is 60' wide, averaging 1' in depth (pools had a maximum depth of 3') and has a rocky bottom. Water was clear with a temperature of 54°F, 8° warmer than adjacent waters of the Sagavanirktok River.

The Ribdon River was surveyed from Lat. 68°42'N, Long. 148°32'W to its confluence with the Sagavanirktok River. This river was surveyed in July using an inflatable boat for transportation. Initial access was by airplane from a landing strip three miles north of Elusive Lake. The river is approximately 47 miles in length, has a rapid velocity of 7 - 10 mph, and for most of its length, consists of two main channels, each 60 - 150' wide and 2 - 3' deep. The water is turbid, pools are infrequent, shallow, and exposed; bottom materials are rocks and gravel. Grayling were captured by gill net; Arctic char and adult grayling potential spawners were taken by angling.

The Sagavanirktok River was surveyed from the confluence with Ribdon River to Franklin Bluffs. This is one of the principal rivers of the North Slope, draining into the Beaufort Sea just east of Prudhoe Bay. It has approximately 20 tributaries in its 175-mile length, including the Ribdon, Lupine, and Ivishak rivers. This river was floated in an inflatable boat from the Ribdon River downstream to the Franklin Bluffs. The river is braided for much of its length with combined widths of 80 - 100 yards. Velocity is rapid, approaching 10 mph, gradient averages 25' per mile, and the water is turbid. Bottom materials consist chiefly of rocks and gravel. Pools are infrequent and the long stretches of deep, fast water are separated by rapids. Silt and debris on riverbanks indicate periodic wide flooding over banks 10 - 12' above the summer river level.

The river is used as a spawning migration route and possibly as a wintering area for Arctic char. Although rain and snow during the survey caused high, turbid water and poor angling, Arctic char in spawning condition were captured off the mouths of the Ribdon and Lupine rivers, and grayling, burbot, and round whitefish were taken by trot line and gill net.

Section Creek was surveyed at Lat. 68°33'N, Long. 148°50'W. It is a tributary of Accomplishment Creek which is a tributary of the Sagavanirktok River. This creek flows through the foothills of the North Slope. A helicopter was used on July 12 for access. The creek is less than 100' wide with clear, fairly swift water, and bottom materials of large boulders, rocks and gravel. Rotenone was used to collect the grayling listed in Table 9 as well as non-migratory char specimens which were subsequently lost.

The Toolik River was surveyed at Lat. 69°10'N, Long. 149°20'W. This tributary of the Kuparuk River was surveyed using a helicopter for access. On July 10, the water temperature was 48°F and ice was still present on the streambanks. Velocity was fairly rapid. The water was clear, and bottom materials were coarse gravel and mud. The stream averaged 20' in width and 1 - 4' in depth with infrequent pools to 6' deep. Rotenone and a gill net were used to capture 14 adult grayling ranging in length from 285 - 355 mm. Small rearing char were sighted but not captured.

An unnamed tributary of Sagavanirktok River was surveyed at Lat. 69°51'N, Long. 149°15'W. This creek enters the Sagavanirktok River from the east, downstream of the Lupine River about 12 miles southwest of Sagwon.

A survey was accomplished by helicopter and rotenone was applied to a 200' long pool near the mouth with resultant capture of three adult grayling, several young grayling, round whitefish, and rearing char, and large numbers of sculpin.

Water temperature on July 16, 1969, was 56°F, stream width was approximately 15', depth was 1 - 2' with infrequent pools to 6' in depth. Bottom materials were coarse gravel and mud.

An unnamed tributary of Ribdon River was surveyed at Lat. 68°47'N, Long. 148°46'W. This small stream was surveyed near its confluence with the Ribdon River. The velocity is rapid, the stream is approximately ten feet wide and two feet deep. The river is 8 miles in length with a gradient of over 100' in that distance. In the lower section of the stream, pools are frequent with depths ranging to five feet, and riffles separate the pools. The water color is clear and bottom materials are rocks, gravel, and mud. A single 225 mm grayling was captured by hook and line, and Arctic char fry were taken by dip net.

Grayling

Table 10 presents the age and length composition of 48 grayling captured in the North Slope lakes and streams surveyed in 1969. The overall linear growth-age composition of these grayling shows a lag of one year when compared to grayling from the Chena River, near Fairbanks, i.e., five-year-old North Slope grayling are approximately the same length as four-year-old Chena River grayling (Roguski, 1969).

TABLE 10 Length and Age Composition of 48 Grayling from Various North Slope Waters, 1969.

Age Class	Length Range (mm)	Mean Length (mm)	No. in Sample
III	160-170	166	3
IV	188-225	211	4
V	225-270	252	5
VI	285-325	303	9
VII	310-345	328	13
VIII	345-384	360	14

Wulik River Arctic Char

In June, 1969, a survey of the Wulik River, tributary to the Arctic Ocean in northwest Alaska, was undertaken in an attempt to capture young Arctic char and thus show evidence of the use of this river by char for spawning.

The river was floated in an inflatable boat from Ikalukrok Creek to the village of Kivalina. Using minnow traps, gill nets, seines, and rotenone, efforts to capture rearing char were made at numerous locations along the river. Only one "smolt"-sized char was captured in a slow moving branch of the Wulik River. Three small char were observed in the Kivalina lagoon. Five adult Arctic char were captured by angling.

On September 18, 1969, several large Arctic char were observed, apparently spawning, in the Wulik River below the confluence with the Ikalukrok River by Commerical Fisheries Division personnel conducting an aerial survey of the river (Carl Yanagawa, viva voca).

Subsistence Char Fishing Kivalina Village

In early June, 1969, residents of Kivalina village reported to have seined two boatloads of char from the lower Wulik River. Based on counts of the numbers and pounds of fish per boatload made in the fall of 1968 (Winslow, 1969), it is estimated that 6,052 char weighing 14,212 pounds were seined. Approximately ten gill nets were fished by villagers from June 1 - 20.

Although no accurate records were kept of the catch, one fisherman took 12 char in 36 net-hours. If this was an average catch figure, approximately 1,600 char, or 3,200 pounds, were taken by gill net.

On June 15, an average of 15 Kivalina villagers were observed angling with a catch of approximately 50 char.

Angling is a popular sport, especially among the children after the ice has gone out of the Wulik River. A conservative estimate of the spring angling catch is 750 char or 1,500 pounds.

The total of all fish captured at Kivalina in the spring of 1969 by all three methods, seine, gill net, and angling, is an estimated 8,402 Arctic char weighing 18,912 pounds.

Twenty-four Wulik River Arctic char from the 1969 spring fishery were examined for age-at-maturity information. This data is presented in Table 11. Twelve of these fish were judged to be potential spawners, and three fish appeared to be spawned out. No correlation could be made between maturity and size or age of fish.

TABLE 11 Length, Sex, Maturity, and Age of 24 Wulik River Char, June, 1969.

Length (mm)	Sex	Maturity*	Age Class
330	M	IMM	VII
410	F	PS	VI
410	F	PS	VIII
410	M	SD	VII
415	M	IMM	----
430	M	SO	VIII
440	M	SD	VI
440	F	PS	VII
450	F	PS	VII
460	F	PS	VII
465	F	SD	VI
470	F	PS	IX
490	M	SD	VIII
490	F	PS	VIII
510	M	IMM	IX
510	M	PS	VII
540	F	PS	VII
590	M	IMM	VIII
600	F	IMM	VIII
620	F	PS	VIII
630	M	SO	VIII
635	F	PS	VIII
690	F	PS	X
710	M	SO	X

*IMM - Immature
PS - Potential spawner
SD - Some development
SO - Spawned out

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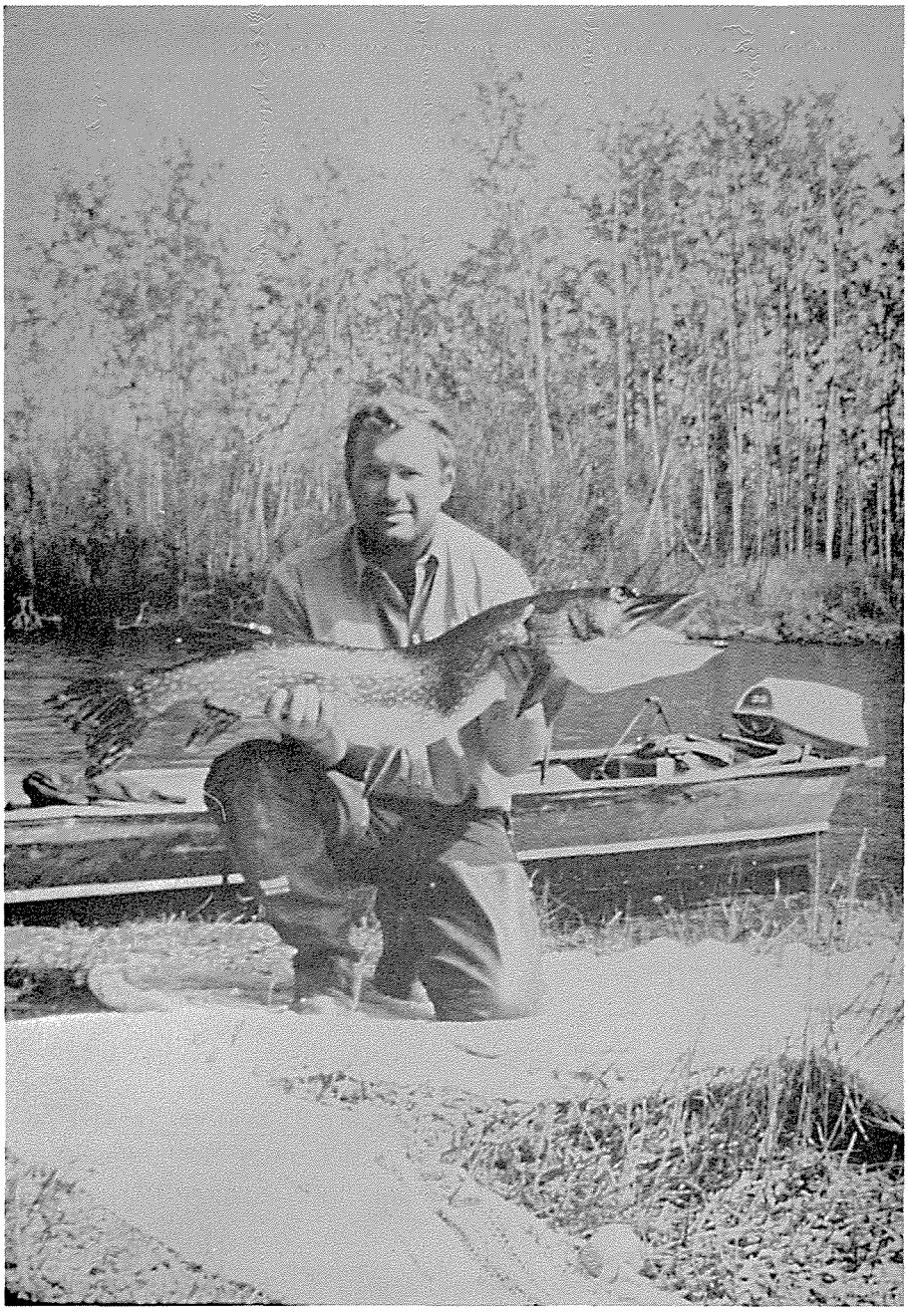

NORTHERN PIKE AS A SPORT FISH IS GROWING IN POPULARITY WITH THE ALASKA ANGLER.